151696

Dear Fred,

The following analysis is in response to your request to evaluate detected lead levels in beach soil samples from the Laurence Harbor beach area in Old Bridge, Middlesex County. The USEPA Office of Solid Waste and Emergency Response recommends soil screening level of 400 ppm for lead in residential land based on results from the Integrated Exposure Uptake and Biokinetic (IEUBK) model. It also recommends limiting exposure to soil lead levels such that a typical (or hypothetical) child or group of similarly exposed children would have a probability of no more than 5% exceeding the 10 µg/dL blood lead level[1], which is the blood lead level of concern for children established by the Centers for Disease Control[2].

The assumptions for the recreational exposure scenario for children aged 6 to 84 months are as follows:

1. Children are exposed to site soil each time the beach is visited.
2. The default lead concentration of the residential soil is 200 ppm[3].
3. IEUBK model default values were used for all other variables.

The predicted geometric mean PbB concentrations and estimates of the probability (%) of exceeding 10 µg/dL for children 6-84 months are shown in Table I.

Table I: Probability (i.e. Risk) Estimates for Various Exposure Scenarios Using Average and Maximum Soil Concentration over a 3-Month Period

Exposure Scenario	Weighted Soil Lead Concentration[1] (ppm)		Geometric Mean PbB[2] (µg/dL)		P_{10} (%)[3]	
	Average Site Lead (515 ppm)	Max Site Lead (1,090 ppm)	Average	Maximum	Average	Maximum
1 site visit per week	245	327	3.8	4.5	1.9	4.4
2 site visits per week	290	454	4.2	5.5	3.2	10
3 site visits per week	335	581	4.6	6.5	4.7	18
4 site visits per week	380	709	4.9	7.5	6.6	27
5 site visits per week	425	836	5.3	8.4	8.9	36
6 site visits per week	470	963	5.7	9.3	11	44
7 site visits per week	515	1,090	6.0	10	14	51

[1]: Calculated using site lead cone and residential lead cone of 200 ppm. For 1 site visit per week: (515 ppm x 1 day/7 days) + (200 ppm x 6 days/7 days) = 245 ppm;
[2]: Results from the IEUBK model. GM PbB = Geometric mean of the blood lead level. All runs using 6-84 months in IEUBK model;
[3]: P_{10} is the probability of a PbB concentration exceeding 10 µg/dL. USEPA goal $P_{10} < 5\%$.

[1] USEPA 1994. Memorandum: OSWER Directive: Revised Interim Soil Lead Guidance for CERCLA sites and RCRA Corrective Action Facilities. OSWER Directive #9355.4-12 August 1994.
[2] CDC 1991. Preventing Lead Poisoning in Young Children. U.S. Department of Health and Human Services, October 1991.
[3] USEPA 2002. User's Guide for the IEUBK model. OSWER Directive #9285.7-42. May 2002.

The data in Table 1 show that the mean blood lead levels would be at or below the action level of 10 µg/dL based on both the average and maximum lead concentration, across all exposure scenarios. However, the P_{10} estimates rise above the recommended protection level ($P_{10} < 5\%$) for frequency of site visits greater than 3 and 1 per week based on the average and maximum lead concentration, respectively. Based on realistic beach activity patterns for children, using the *average* lead level for risk estimates is more representative of a beach exposure scenario since children are more likely to move around than stay in a single area over the course of a day. Therefore, it can be concluded that children (aged 6 to 84 months) who visit the beach more than 3 days per week over three month period would be at risk at having elevated blood lead levels higher than the recommended protection level. Since the average soil lead level at the beach is driven by elevated lead in one area, it is recommended that access to this area be restricted via use of temporary fencing while additional delineation is planned. As per our phone conversation, warning signs should be posted along the sea/retaining wall to prevent access to this area.